

CLAIMS

1. A microfluidic device adapted such that the flow of fluids within the device is controlled by different surfaces of the device having different surface characteristics.
2. A microfluidic device according to claim 1 comprising a substrate whose surface is treated to provide areas having different surface characteristics, said areas being arranged to enable control of the flow of fluids passing across the substrate.
3. A microfluidic device according to ~~either claim 1 or 2~~ <sup>claim 1</sup> with the proviso that the substrate is not hydrated oxide material.
4. A microfluidic device according to ~~either claim 2 or 3~~ <sup>claim 2</sup> wherein the substrate has a hydrophobic surface interspersed with hydrophilic areas.
5. A microfluidic device according to claim 4 further comprising a second substrate arranged approximately parallel to the first substrate such that fluid entering the device between the substrates will flow along predetermined pathways.
6. A device according to ~~claims 4 or 5~~ <sup>claim 4</sup> wherein the plurality of hydrophilic areas is an array of hydrophilic spots.
7. A device according to claim 6 wherein the hydrophilic spots are arranged in lines radiating from a central point on the first substrate.
8. A device according to claim 7 wherein the lines of spots are separated by walls connecting the two substrates.
9. A microfluidic device according to ~~either claim 2 or 3~~ <sup>claim 2</sup> wherein the substrate has hydrophobic and hydrophilic surface areas which define a pathway for fluid to travel over the surface in which there is at least one hydrophobic/ hydrophilic interface.
10. A microfluidic device according to claim 1, and having predetermined pathways for fluid flow, the surfaces of such pathways being hydrophilic, in which a valve is formed by a section in a pathway

having a hydrophobic surface.

11. A microfluidic device according to ~~any one of claims 4 to 10~~ in which the surface of at least some of the hydrophilic surfaces is treated to enable the culture of cells.

5 12. A microfluidic device according to claim 11 which contains gas pathways to enable the access of air to the cell culture.

13. A microfluidic device according to claim 1 wherein the different surface characteristics are defined by different areas of the surface carrying different electrical charges.

10 14. A microfluidic device according to claim 13 wherein means are provided for changing the charge on the surface to alter the fluid pathway.

15. A microfluidic device according to claim 1 wherein the different surface characteristics are defined by different areas of the surface being differently magnetised.

15 16. A microfluidic device according to claim 15 wherein means are provided for changing the magnetisation of the surface to alter the fluid pathway.

17. A microfluidic device according to ~~any of the previous claims~~ which is circular.

20 18. A microfluidic device according to claim 17 which is adapted for  
rotation of the device.

19. A microfluidic device according to either one of claims 17 or 18 which has an inlet for fluids towards the centre of the device and an annular outlet for fluids towards the circumference of the device.